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Students with Discrepant High School GPA and SAT® I Scores

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Introduction

The SAT® and high school grades are the most accurate predictors of first-year college performance.[1] Together, these two measures have a high multiple correlation (r=.7) with first-year college grades when the correlation coefficient is corrected for restriction in range, criterion unreliability, and different course grading standards (Bridgeman, McCamley-Jenkins, and Ervin, 2000; Ramist, Lewis, and McCamley-Jenkins, 1993). Although high school grades typically are slightly better predictors of college grades, SAT scores add significantly to the prediction, representing an increment of almost .10 to the correlation (Camara and Echternacht, 2000). The current study examined predictions of first-year college performance for students whose SAT score and high school grades were discrepant and compared these results to predictions for students whose SAT score and high school grades were not discrepant. The current analyses replicated those performed in an earlier study conducted in 1990 by Baydar but utilized a larger sample of schools and recentered SAT scores. In addition, the current study used SAT scores that emphasized critical reading, grid-in math items, and calculator use, and de-emphasized antonym items (Bridgeman, McCamley-Jenkins, and Ervin, 2000).

KEYWORDS:
Test Validity
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Baydar (1990) analyzed data from 5,137 students at three colleges. Students were classified into three groups depending on the relationship between their SAT scores and high school grade-point average (HSGPA). The nondiscrepant group (NDS) included students with standardized SAT scores and HSGPA within one standard deviation of each other. The high school discrepant group (HSD) included students with HSGPA at least one standard deviation above SAT scores, and the SAT discrepant group (SATD) included students with SAT scores at least one standard deviation above HSGPA. The results indicated that approximately two-thirds of the students were in the NDS group, 17.6 percent were in the HSD group, and 17.1 percent were in the SATD group.

Multiple correlations of HSGPA and SAT with first-year college GPA (FGPA) were lowest for the HSD group, yet the SAT was more highly correlated with FGPA for this group at two of the three colleges. Differences were found in the demographic background of students in the three groups. Female students and minority students were more heavily represented in the HSD group than in the other two groups. The proportion of African American and Hispanic students in the HSD group was approximately twice that found in the SATD group and 1.5 times that in the NDS group. In addition, students in the HSD group had generally lower family income and attainment. Finally, there were differences in college course selection among the three groups. Students in the SATD group were more likely to take more courses in mathematics, science, and arts, as well as advanced courses; the HSD group took the largest proportion of remedial courses and were more likely to take social science and language courses.

[1]Prior to 1993-94, the College Board offered the Scholastic Aptitude Test (SAT). This test was replaced by the SAT I: Reasoning Test. In this paper SAT is used to refer to both the earlier test and its replacement for consistency.

Method

This study used SAT and Student Descriptive Questionnaire (SDQ) data from 48,410 students who entered as college freshmen in 1994 or 1995 at 23 colleges participating in a validity study of the recentered SAT (Bridgeman, McCamley-Jenkins, and Ervin, 2000). For the purposes of analysis, the self-reported high school grades on the SDQ (HSGPA) were placed on a 12-point scale (i.e., F=0, D=1, D+=1.3, C-=1.7, C=2, C+=2.3, B-=2.7, B=3, B+=3.3, A-=3.7, A=4, and A+= 4.3). Standardized scores were computed for the combined SAT (verbal and mathematical) and self-reported, cumulative high school grades. Three groups of students were created based on a comparison of standardized HSGPA and SAT scores; these groups were labeled (a) nondiscrepant scores (NDS), (b) HSGPA discrepant scores (HSD), and (c) SAT discrepant scores (SATD). Students in the NDS group had a standardized SAT score that was within one standard deviation of their HSGPA score. Students in the HSD group had a standardized SAT score that was more than one standard deviation below, or roughly at least 34 percent lower, than their HSGPA score. Students in the SATD group had a standardized SAT score that was more than one standard deviation above, or roughly at least 34 percent higher, than their HSGPA score.

Four types of analyses were performed on the three groups of students. First, frequency distributions were computed for gender, race/ethnicity, family income, first language, and citizenship in the NDS, HSD, and SATD groups. Chi-square tests of association were used to test the significance of the differences in proportions in these demographic variables across the three score discrepancy groups. Next, descriptive statistics (means and standard deviations) of SAT scores, HSGPA, and FGPA were computed for the NDS, HSD, and SATD groups. Third, regression analyses were performed within the NDS, HSD, and SATD groups to investigate the relationship between SAT verbal, SAT mathematical, combined SAT, HSGPA, and FGPA, and to examine the predictive validity of the SAT and HSGPA for predicting FGPA. Finally, over- and underprediction of FGPA for gender and racial/ethnic subgroups was determined for the NDS, HSD, and SATD groups.

Results

In this study, 68 percent (N=32,920) of students were categorized as NDS, 16.2 percent (N=7,837) were categorized as HSD, and 15.8 percent (N=7,653) were categorized as SATD. These percentages are similar to those obtained by Baydar (1990); however, in this study a slightly larger percentage of students were categorized as having nondiscrepant SAT scores and HSGPA. This finding indicates that over two-thirds of students in the current sample performed consistently with respect to high school grades and admission test scores on the same scale. Table 1 summarizes the demographic characteristics of the NDS, HSD, and SATD groups and the chi-square statistics for gender, race/ethnicity, parents' combined income, first language spoken, and citizenship status. The chi-square values associated with all of these variables were very large in magnitude and statistically significant ($p < .01$), which is expected given the large samples used in this analysis. As found by Baydar (1990), female students and ethnic minority students (African American, Asian American, and Hispanic students) were much more heavily represented in the HSD group than in the NDS or SATD groups. In addition, a higher percentage of students in the HSD group spoke languages other than English and were not U.S. citizens or nationals. Similar to the results found in the Baydar study, students in the HSD group had relatively lower family income.

There were also different trends for intended college major across the three groups. Students in the HSD group were more likely to choose a major in education or the health professions and were less likely to choose a major in areas such as the visual or performing arts, computer and information sciences, engineering, language and literature, and social sciences and history. It is interesting that the HSD group also had a smaller proportion of students who were undecided about a college major.

Table 2 illustrates the means and standard deviations of SAT scores, HSGPA, and FGPA for the NDS, HSD, and SATD groups. As expected, the HSD group had substantially lower mean SAT scores in both the verbal and mathematical sections, yet the mean HSGPA of this group was greater than the other two groups. Although the students in the HSD group had a higher mean HSGPA, FGPA scores were similar to those in the other two groups.

In order to estimate the validity of using the SAT and HSGPA in the prediction of FGPA for students with discrepant–nondiscrepant SAT and HSGPA, several regression analyses were performed (see Table 3). In general results indicated that the SAT is an important predictor of college success in all groups and even predicts a statistically significant proportion of the variability in FGPA after taking into account the variance in FGPA accounted for by HSGPA. Table

Table 1

Demographic Characteristics of NDS, HSD, and SATD Groups and Chi-Square Statistics

	N	*Total*	*NDS*	*HSD*	*SATD*	*chi-square*
Gender						
Total	51,623	100.0	68.0	16.2	15.8	
Female	26,850	52.0	52.9	67.9	34.1	5088.6**
Male	24,773	48.0	47.1	32.1	65.9	
Race/Ethnicity						
American Indian	287	0.6	0.6	0.7	0.6	
Asian/Pacific Islander	7,735	17.0	16.8	18.4	16.8	
Black/African American	2,765	6.1	5.4	10.6	4.4	822.9**
Hispanic	1,877	4.1	3.6	8.4	2.2	
White	31,467	69.3	70.8	59.3	72.9	
Other	1,271	2.8	2.7	2.6	3.1	
Parents' Combined Income						
< $10,000	1,619	3.3	2.7	7.5	1.6	
$10,000-25,000	5,516	11.2	10.6	18.8	6.7	
$25,000-40,000	8,104	16.5	16.4	21.2	12.7	
$40,000-60,000	9,757	19.8	20.5	19.8	18.1	3468.5**
$60,000-80,000	7,620	15.5	16.0	13.4	16.3	
$80,000-100,000	4,473	9.1	9.6	5.9	10.6	
> $100,000	6,956	14.1	14.3	6.6	21.8	
No Response	5,180	10.5	9.8	6.9	12.2	
First Language Spoken						
English only	38,156	76.8	78.3	70.3	80.1	
English and other language	5,266	10.6	10.4	12.4	10.0	4136.8**
Another language	5,273	10.6	10.1	16.2	7.7	
No response	972	2.0	1.2	1.1	2.2	
Citizenship Status						
U.S. Citizen or National	44,785	90.2	91.5	85.9	92.3	
U.S. Perm. Resident/Refugee	3,327	6.7	6.1	11.7	4.4	
Citizen of another country	434	0.9	0.9	1.1	0.7	3886.6**
Other or unknown	58	0.1	0.1	0.2	0.2	
No response	1,063	2.1	1.4	1.2	2.4	
Disability						
No disability	46,447	94.5	95.6	95.5	92.9	
Disabled	1,181	2.4	2.2	2.5	3.4	—
No response	1,530	3.1	2.2	2.0	3.7	
Intended Major*						
Agriculture and Natural Res.	761	1.6	1.5	1.9	1.4	
Architecture/Environ. Design	1,170	2.4	2.5	2.1	2.4	
Arts: Visual and Performing	1,979	4.1	4.1	2.9	5.2	
Biological Sciences	3,939	8.2	8.7	7.6	7.2	
Business and Commerce	5,199	10.9	10.9	11.0	10.7	
Communications	1,878	3.9	4.0	3.2	4.3	
Computer and Info. Sciences	1,231	2.6	2.4	1.8	4.1	
Education	2,272	4.7	4.6	6.2	3.9	—
Engineering	6,334	13.2	13.5	10.6	14.7	
Health Professions	10,585	22.1	21.8	31.2	14.4	
Language and Literature	734	1.5	1.5	0.6	2.3	
Physical Sciences	983	2.1	2.0	1.3	3.0	
Public Affairs and Services	666	1.4	1.3	1.7	1.4	
Social Sciences and History	5,501	11.5	11.5	10.6	12.0	
Undecided	3,430	7.2	7.1	5.5	9.4	

* Categories representing less than one percent of the total population are not shown.

** Statistically significant at $p < .01$.

Table 2

Means and Standard Deviations of SAT, HSGPA, and FGPA

	NDS	*HSD*	*SATD*
SAT Combined	1156.9 (163.9)	982.9 (133.6)	1262.3 (166.8)
SAT–V	570.5 (90.9)	479.0 (79.0)	628.5 (92.8)
SAT–M	586.4 (92.8)	503.9 (81.7)	633.9 (92.1)
HSGPA	3.6 (0.5)	3.9 (0.3)	3.1 (0.5)
FGPA	2.8 (0.7)	2.7 (0.7)	2.7 (0.8)

3 shows that HSGPA accounted for approximately 21 percent of the variance of FGPA for both the NDS and SATD groups, but accounted for only about 13 percent for the HSD group. When the SAT was added to the prediction equation, the R-square of FGPA increased across all groups, but especially for the HSD and NDS groups.

A comparison of the results of the regression analysis across groups revealed that the NDS group had the highest R-square of FGPA with SAT–M and SAT-V combined, and that the SATD group had the largest R-square of FGPA with SAT–V and HSGPA. The HSD group had the lowest R-square in all five regression analyses. These findings do not replicate Baydar (1990) who found that the SAT was more highly correlated with FGPA for the HSD group at two of the three schools in his study. However, the earlier study examined results from three colleges separately, while the present analyses examined aggregate data across 23 colleges. It is important to note, however, that the R-square values presented in the current report are underestimated due to a restriction in range.

Since the R-square is a function of the variance in the dependent variable (R-square=1 – Mean square error [*MSE*]/σ^2_Y), sampling methods that produce a *real* decrease in the variance of the dependent variable result in a restriction in range and, consequently, an underestimation of R-square (Nunnaly, 1978). Two of the sampling methods applied in the current study resulted in a restriction in range. First, since not all of the students who submitted HSGPA and SAT scores to the 23 schools considered in the analysis enrolled and earned an FGPA score, the variance on FGPA is smaller than it would have been had all the applicants completed a year of study. Second, the selection criteria for the three discrepant score groups resulted in a decrease in the variance of FGPA across groups. Normally, underestimation of R-square due to restriction in range would be corrected for using the standard Pearson-Lawley procedure (Gulliksen, 1950). However, since this procedure is based on several important assumptions that were not met in the current study (e. g., homogeneity of regression), it was not appropriate to perform this correction.

In an effort to present a more accurate representation of the relationship between SAT, HSGPA, and FGPA in each group, the Mean square error (MSE) was reported (see Table 2). The MSE is "a measure of the degree of variability of the points around a regression line" (Vogt, 1993) and can be used as an indicator of the strength of the relationship between predictors and criterion. The smaller the MSE, the stronger the relationship between predictor(s) and criterion. Interestingly, a comparison of R-square values to

Table 3

Regression of SAT and HSGPA on FGPA

Predictor	*Statistic*	*NDS (N=32,920)*	*HSD (N=7,837)*	*SATD (N=7,653)*
SAT–V	R-square*	.167	.093	.182
	MSE	(.463)	(.475)	(.563)
SAT–M	R-square	.166	.106	.152
	MSE	(.464)	(.468)	(.584)
SAT Combined	R-square	.209	.144	.205
	MSE	(.446)	(.449)	(.547)
HSGPA	R-square	.213	.127	.215
	MSE	(.438)	(.457)	(.540)
HSGPA + SAT	R-square	.232	.150	.225
(V and M)	*MSE*	(.428)	(.445)	(.533)
SAT Incremental	R-square change	.019	.023	.010
Validity	*MSE* change	(.010)	(.012)	(.007)

* All R-square values significant at the .01 level.

Table 4

Over- (+) and Underprediction (-) of FGPA by Discrepancy Category, Gender, and Racial/Ethnic Subgroup

Racial/Ethnic Group and Gender		*NDS*	*HSD*	*SATD*
American Indian				
	Female	+.02	+.31	-.23
	Male	+.21	+.36	+.32
	Total	+.10	+.32	+.17
Asian American				
	Female	-.07	-.02	-.12
	Male	+.05	+.11	+.01
	Total	-.01	+.03	-.03
African American				
	Female	-.01	+.05	-.13
	Male	+.17	+.25	+.10
	Total	+.06	+.10	+.01
Hispanic				
	Female	+.07	+.11	-.06
	Male	+.21	+.13	+.21
	Total	+.13	+.12	+.11
White				
	Female	-.10	-.08	-.13
	Male	+.08	+.03	+.07
	Total	-.02	-.05	0
Other				
	Female	-.12	-.11	-.19
	Male	+.03	+.05	-.03
	Total	-.05	-.06	-.10
Total				
	Female	-.08	-.04	-.13
	Male	+.08	+.08	+.06
	Total	-.005	-.003	-.004

MSE values shows that the restriction in range caused the R-square to be underestimated in the HSD and NDS groups but overestimated in the SATD group.

The regression analysis with HSGPA and SAT as predictors was used to compute a predicted FGPA for each student in the NDS, HSD, and SATD groups. The predicted and actual FGPA was compared for each racial–ethnic and gender group within the three score discrepancy groups and mean residuals were computed. Table 4 displays these results. As is commonly found in the literature on over- and underprediction, this study revealed that the FGPA for females was generally underpredicted, and the FGPA for minority students was overpredicted. There were some differences in these patterns within the NDS, HSD, and SATD groups, however. An overprediction was greatest for American Indian and African American students in the HSD group and for Hispanics across all three groups. In addition, females in the SATD group were underpredicted to a greater extent than in the other two groups.

Similar analyses were conducted using a half of a standard deviation to identify discrepant groups. It is logical that when a smaller standard deviation is used to identify discrepant groups, more students will be classified into these categories. Students in the SATD group increased from 15.8 percent to 28.6 percent and students in the HSD group increased from 16.2 percent to 31.9 percent. Students in the NDS group decreased from 68 percent when a full standard deviation was used to identify discrepancy, to 35.1 percent when a half of a standard deviation was used. However, the general demographic backgrounds of students in these groups did not change.

The mean SAT, HSGPA, and FGPA of the NDS group did not change, but the means for other groups did change when increased numbers of students were added based on a smaller standard deviation. As expected, the mean SAT scores decreased for the SATD group (13 points on SAT–V and 10 points on SAT–M), while the mean HSGPA increased from 3.1 to 3.3. For the HSD group, the mean SAT score now increased (26 points on SAT–V and 24 points on SAT–M) while the mean HSGPA decreased by less than .1. The FGPA for all three groups did not change markedly.

Summary and Conclusions

This study explored the characteristics of students with discrepant high school grades and SAT scores, and examined the predictive validity of high school GPA (HSGPA) and the SAT for predicting the first-year college GPA (FGPA) of these students. Approximately two-thirds of the students in this study had HSGPA and SAT scores that were within one standard deviation of each other, while the remaining one-third had discrepant scores. This third of the sample was evenly split between students whose standardized SAT score was larger than their standardized high school GPA (SATD group) and students whose standardized HSGPA was larger than their standardized SAT score (HSD group). This latter group of students is of most interest, since there is the most concern that the SAT is not accurately measuring the ability of these students and may unfairly disadvantage them in college admission.

As revealed in this study, there are clear differences in the characteristics of students with discrepant scores as compared to students with nondiscrepant scores. Females and minority students (Asian American, African American, and Hispanic) are much more heavily represented in the HSD

group than in the NDS or SATD group. Students in the HSD group have relatively lower family income, and a higher percentage of these students speak languages other than English and are not U.S. citizens or nationals. In addition, students in the HSD group are more likely to choose a major in education or the health professions and are less likely to choose a major in areas such as the visual or performing arts, computer and information sciences, engineering, language and literature, and social sciences and history.

Although students in the HSD group have higher high school grades than students in the NDS or SATD groups, these students do not have a higher FGPA. In fact, the R-square of HSGPA and college GPA is lower for the HSD group than for the other two groups. In addition, HSGPA accounts for a smaller amount of the variance of FGPA for the HSD group. Finally, there is a tendency to overpredict FGPA more for minorities in the HSD group than in the other two groups. Taken together, these findings suggest that students with a high HSGPA in the presence of low SAT scores will not do any better in college than students with lower HSGPA scores but higher SAT scores. Therefore, the SAT may be a more accurate predictor than HSGPA for these students.

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